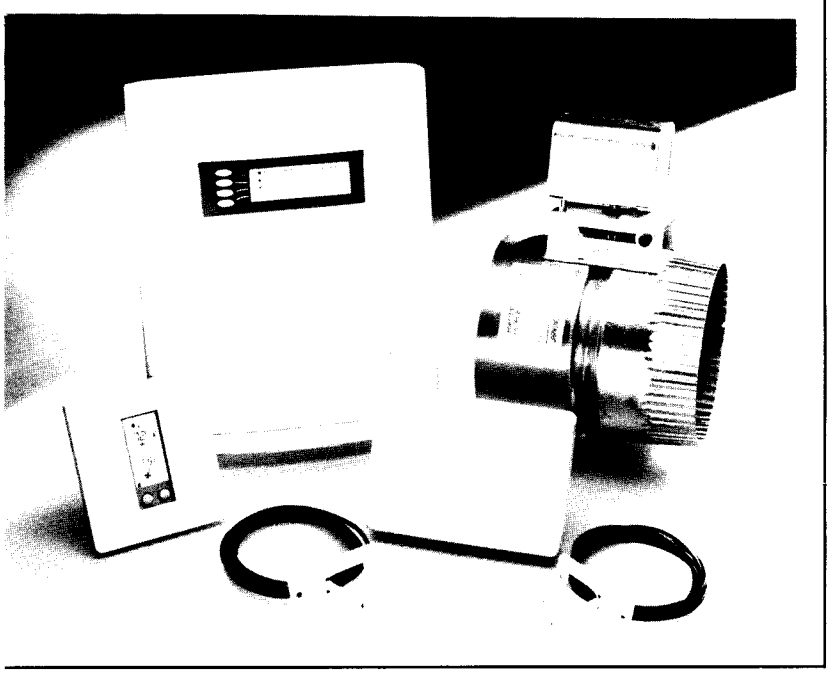
Robertshaw

The Zone Control Book



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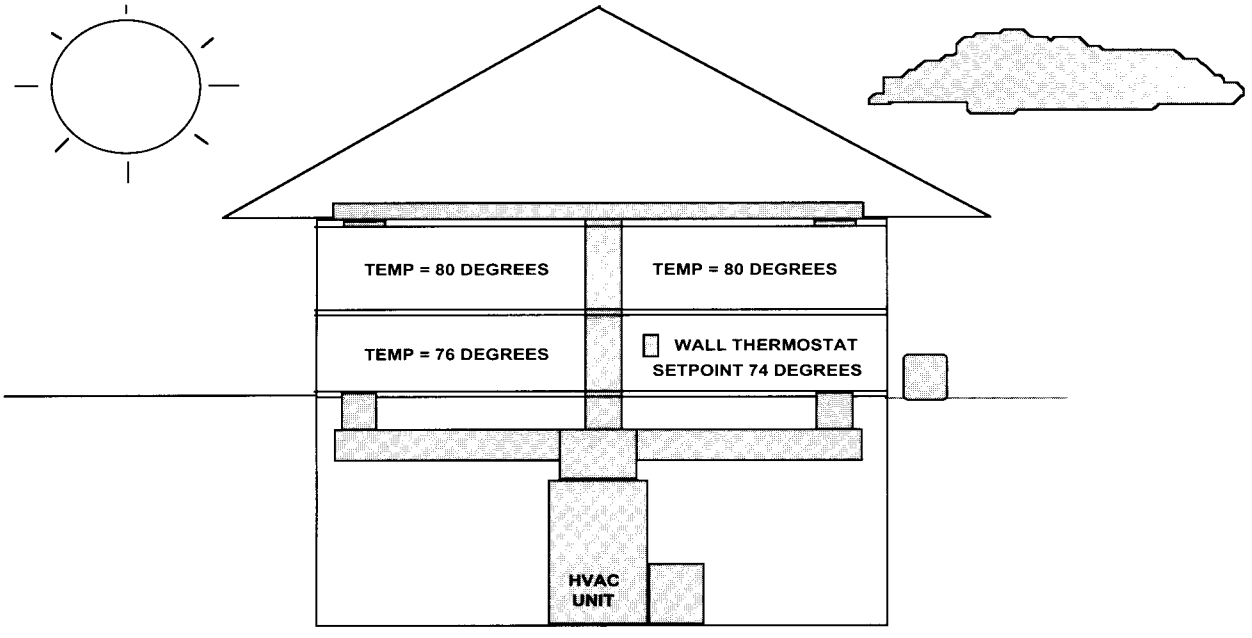
INTRODUCTION TO FORCED AIR ZONE CONTROL

Zoned Heating and Cooling System

Professional contractors hear the complaint over and over again; The bedrooms are freezing while the family room is too hot. Or, one office is too cold, and the conference room is always too warm. Whether the dilemma is residential or commercial, it all adds up to the fact that a single heating and cooling system is controlled by one thermostat. That thermostat is usually located in a hallway or on an inside wall that represents the most general load characteristics of the habitat. As dependable as the thermostat might be, it can only sense changes in temperature in the general area where it is located. Unfortunately, temperature gain or loss in an enclosed structure varies from room to room. These variations can be caused by both internal and external influences such as wind, solar radiation and heat generated from lighting, appliances, equipment and humans. Warm air rises while cold air falls and the laws of physics make it virtually impossible to maintain balanced temperatures on a room by room basis without forced air zoning.



Typical heating and cooling system without zone control

A zone control system can divide a home or commercial building into individual temperature controlled areas called "zones". Conditioned air generated from a single heating and cooling system can be intelligently directed through the discharge air duct work via a combination of controlling components. A typical installation would include a central system, zone control logic panel, motorized zone dampers, zone thermostats and a bypass system. Each component is wired to the logic panel which in turn is wired to the heating and cooling equipment. The logic panel is a vital component in any zone control application as it creates a compatible interface between a single heating and cooling system and multiple zone thermostats, zone dampers and numerous optional peripherals that can be added to the system. Today's zone control systems require a microprocessor and solid-state components designed to assure intelligent system operation and compatible interface with a wide range of equipment while providing optimum system protection.

When properly applied, forced air zone control can provide a cost efficient alternative as compared to dual forced air system installations while enhancing comfort and energy savings.

GENERAL APPLICATION AND DESIGN CONSIDERATIONS

Residential and Commercial

A forced air zone control application starts with similar loads. Groups of rooms (zones) that have the same or like load requirements are referred to as a "Thermal Zone". Square footage, architectural design, construction materials and geography play an important role in forced air zoning considerations. Remember, no two applications are the same. Zones that have extreme load differences requiring constant or extended opposing heat or cool calls should be zoned with additional forced air equipment.

Forced air zone control systems are not designed to balance air flow. Good HVAC design and a balanced system are important criteria in all zone control applications.

Zone thermostat location is a key priority. Remember, the thermostat controls the temperature and should be located within the zone and at a maximum distance from registers, return air grills and any internal or external influence that would cause a false temperature indication.

HVAC equipment must be properly sized. Heat removal and addition must be done by the equipment and discharged air into the zone(s). The manufacturers minimum and maximum design parameters should never be exceeded. Minimize over sizing of equipment and whenever possible, utilize capacity control such as two-stage furnaces, multi stage compressor systems or two speed compressors. Over sizing equipment compounds design problems while capacity control simplifies and allows for design flexibility.

Proper bypass air is critical in maintaining constant system static pressure. The Δt can be increased to the manufacturer's maximum by decreasing airflow or by recirculating some of the air back to the return air using a bypass system.

Air Conditioning is equipment specific and dependent on coil frosting. The entering wet-bulb temperature and amount of cooling coil heat transfer surface will greatly influence the amount of bypass possible. Most systems must deliver 320 to 360 SCFM per ton to the space to prevent frosting. Low limit protection is always recommended in conjunction with bypass systems.

Heat-pump equipment is specific and dependent on mild weather trip out limits. Air conditioning guidelines of 320 to 360 SCFM per ton should be applied to most systems.

Wet-heat systems limits are dependent on the control schemes and register/grill placement. Floor registers may limit discharge air to 140°F or less as a safety consideration. However, ceiling registers may have no limits.

Entering air temperature to a blower motor should not exceed motor design temperatures. A motor fully loaded at maximum CFM and static pressure with the return opposite to the motor should have an 85°F guideline. A lightly loaded motor facing into the return may be able to handle 110°F entering air temperature.

Direct Bypass to the return plenum from the supply plenum is limited by the following guidelines:

$$\textbf{Direct Bypass Maximum} = \left(\frac{\Delta t \text{ Design (A)}}{\Delta t \text{ Design (B)}}\right) (100\%)$$

(A) Contractor's design Δt = (Supply - Return Air Temperatures)

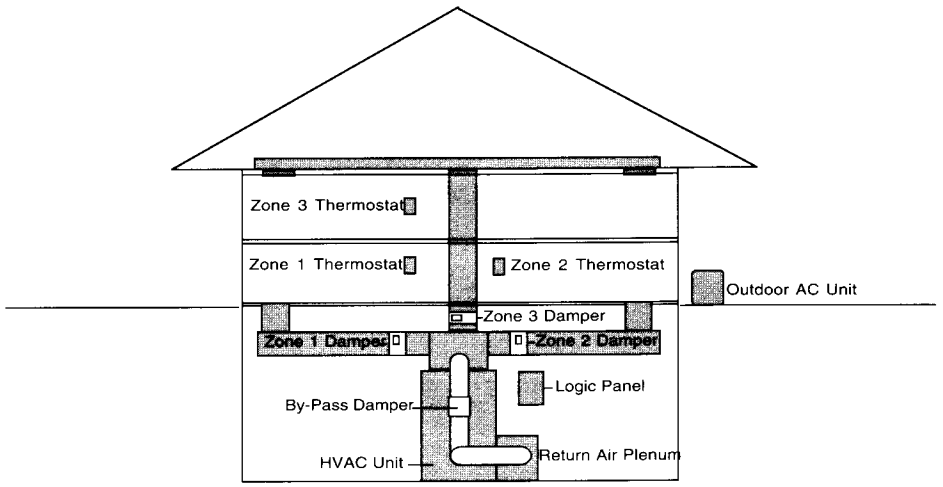
(B) Manufacturer's Maximum Δt = (Maximum Allowed Temperature Rise Across the Furnace)

Zone-by-Zone load calculations are recommended. Use Manual "J" or equivalent procedures to determine standard zone airflow requirements. Peak load adjustment to standard Manual "J" cooling airflow is required based on the zone orientation and glass to wall ratios (Peak only.) A zoned system is designed to maintain the individual zone thermostat setpoint. Therefore, the average cooling load must be adjusted to the peak load if there is no diversity in the zone. Individual zoned airflow must be determined and adjusted to insure sufficient airflow in the cooling mode.

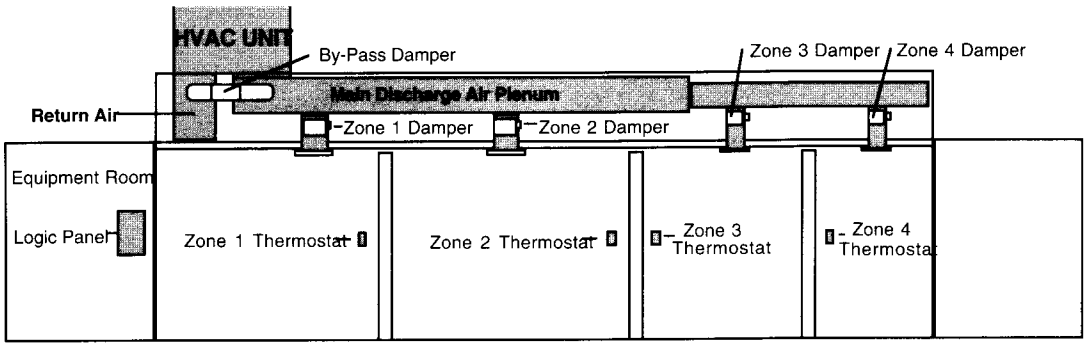
Use Manual "D" or equivalent to size duct and select registers. Duct sizing is dependent upon the following:

1. Total number of zones
2. Number of heating and cooling stages
3. Type of equipment (Gas, Oil, Electric, Heat Pump, Dual Fuel, Wet Heat)
4. Indoor air movers (PSC motor or ICM/EMC motor)
5. Bypass air system

TYPICAL RESIDENTIAL COMPONENT CONFIGURATION



TYPICAL COMMERCIAL COMPONENT CONFIGURATION



Motorized zone damper placement is important. Motorized zone dampers should be located on trunk lines as close to the main supply plenum as possible or when necessary, where branch lines intersect the trunk. This will greatly minimize air noise and reduce turbulence. Always make sure the zone dampers are accessible for service and/or replacement.

Plenty of return air provides optimum results. It is recommended that each zone have its own return whenever possible. When this is not possible, the return air path from one zone should not influence any other zone thermostat. Sufficient return air is required to maintain proper zone control. Do not rely on free air infiltration to get the job done.

BYPASS SYSTEMS AND SIZING

Principles of Operation

In order to maintain proper air flow and constant static pressure through the HVAC system, a bypass system incorporating either a barometric (limited to 5 tons of cooling) or motorized modulating type damper combined with a static pressure controller is recommended. When properly installed and adjusted, the bypass system will allow discharge air to be directed back into the return plenum or an above ceiling open air return whenever zone dampers are closed to maintain a constant static pressure.

When zone control is applied to HVAC equipment having an economizer that is not equipped with a relief damper, it may be necessary to re-link the return air damper so that it will always remain thirty percent open or the bypass system may not function properly.

Bypass Damper Sizing

Robertshaw Bypass dampers are sized based on the cooling capacity (tons) of the equipment being zoned.

BYPASS DAMPER SIZING CHART

TONS OF COOLING	Bypass DAMPER SIZE
3	10"
3.5	10"
4	12"
5	12"
7.5	14"
10	14"
12.5	16"
15	18"
17.5	18"
20	(2) 14"
25	(2) 16"
30	(2) 18"

Note: Direct Bypass to a central return air duct from a main discharge air plenum is limited by the following guidelines

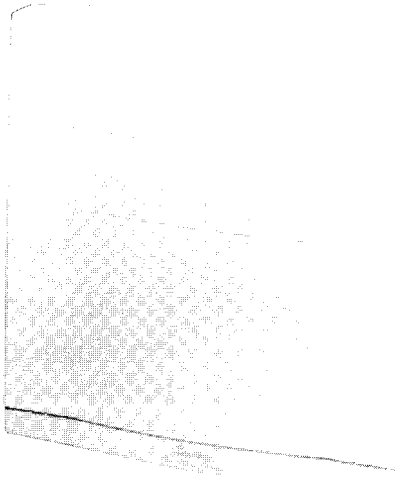
$$\text{Direct Bypass Maximum} = \left(\frac{\Delta t \text{ Design (A)}}{\Delta t \text{ Design (B)}}\right) (100\%)$$

(A) Contractor's design Δt = (Supply - Return Air Temperatures)

(B) Manufacturer's Maximum Δt = (Maximum Allowed Temperature Rise Across the Furnace)

Robertshaw "CLASSIC"

General Overview



The Robertshaw Classic zone control system is designed to control conditioned air in up to three zones using a single heating and cooling unit. The Classic system is compatible with single stage heating and cooling units, single compressor heat pumps with auxiliary heat and dual fuel equipment. The temperature in each zone is controlled by an individual thermostat. The zone thermostat can be electromechanical, solid state programmable or non-programmable. Regardless of the equipment configuration, the zone thermostats need be only single stage, heat/cool type. Air distribution is controlled by individual duct mounted motorized zone dampers. All zone thermostats and dampers are wired directly to the Classic logic panel on dedicated zone terminal blocks. The logic panel is wired directly to the HVAC equipment terminal strip. Power for the zone thermostats and motorized zone dampers is provided through the logic panel via a dedicated 24VAC, 75VA transformer.

Features

- Ultra slim styled, high impact plastic cabinet (8-3/4"W x 9-1/2"H x 1-3/4"D)
- First call priority method of control operation
- Uses any single stage thermostat (Heat pump thermostats not required)
- LED indicators for all system functions
- Solid-state logic panel has auto-reset current limiting outputs (No fuses required)
- Controls single-stage heat/cool units, single compressor heat pumps with auxiliary heat, oil, electric or dual fuel units. (Fossil fuel kits are not required when used on dual fuel applications)
- Controls up to 3 zones
- 15 minute upstage to auxiliary heat on heat pumps. (Non-adjustable)
- 2 or 3 wire, two position motorized zone damper compatible
- All low voltage wiring (24 Volt UL Class II)
- Minimum ON/OFF times of 4 minutes with built-in short cycle protection
- Minimum ON/OFF time override button (For Start-up / Testing)
- Remote Mode Selector Switch capable (Heat/Auto/Cool)
- 45 second fan purge into last zone(s) calling
- Slide switch selectors for setting:
    - Heat pump or Heat/Cool
    - Add-On (Dual Fuel) or Normal
    - Plenum Fan Control or Fan ON with Heat Call
    - Emergency Heat (Also assigned to EH terminal for external switch)

SEQUENCE OF OPERATION

Initial Power Up

When the logic panel is first powered up, it will immediately process any fan calls from the zone thermostats but will ignore heating and cooling calls for a delay of up to 4 minutes. After the 4 minute delay, the logic panel will accept heating or cooling calls based on a "First Call" priority. If opposite calls are received during initial power up, the logic panel will process heating calls first.

Establishing Mode of Operation

The equipment mode of operation (Heat/Auto/Cool) is only limited to the capability of the selected zone thermostats. The logic panel is designed to accept Auto or Manual changeover thermostats. Heat Only or Cool Only operation can be selected by using a jumper wire or remotely using an optional selector switch wired to a set of dedicated terminals inside the panel. When the logic panel is set in a single mode of operation, it will ignore the opposite calls from all zone thermostats.

Control Operation (Heat/Cool)

Once the heating or cooling mode is established and a call for that mode has been received by the logic panel, the panel will open the associated damper(s) and close any damper not matching the established mode of operation. Any zone thermostat fan call input will be ignored by the panel. The logic panel will energize the equipment in the proper mode of operation and will establish a minimum 4 minute ON time or until the last zone calling is satisfied. Once all zones are satisfied, the equipment will be de-energized at which time the logic panel will initiate a 45 second purge cycle into the last zone calling. After the purge cycle, the panel will perform the following sequence:

1. If no zone thermostats are calling for constant fan, all zone dampers will be opened and the fan relay de-energized to allow for any hard wired low speed fan distribution of air into all zones.
2. If any zone is calling for constant fan, the control panel will keep the fan relay energized and open all zone dampers.
3. If an opposite call has taken place and the logic panel is in the Auto Changeover mode, it will change the mode of operation to satisfy the new call(s) as described above.

Control Operation (Heat Pump)

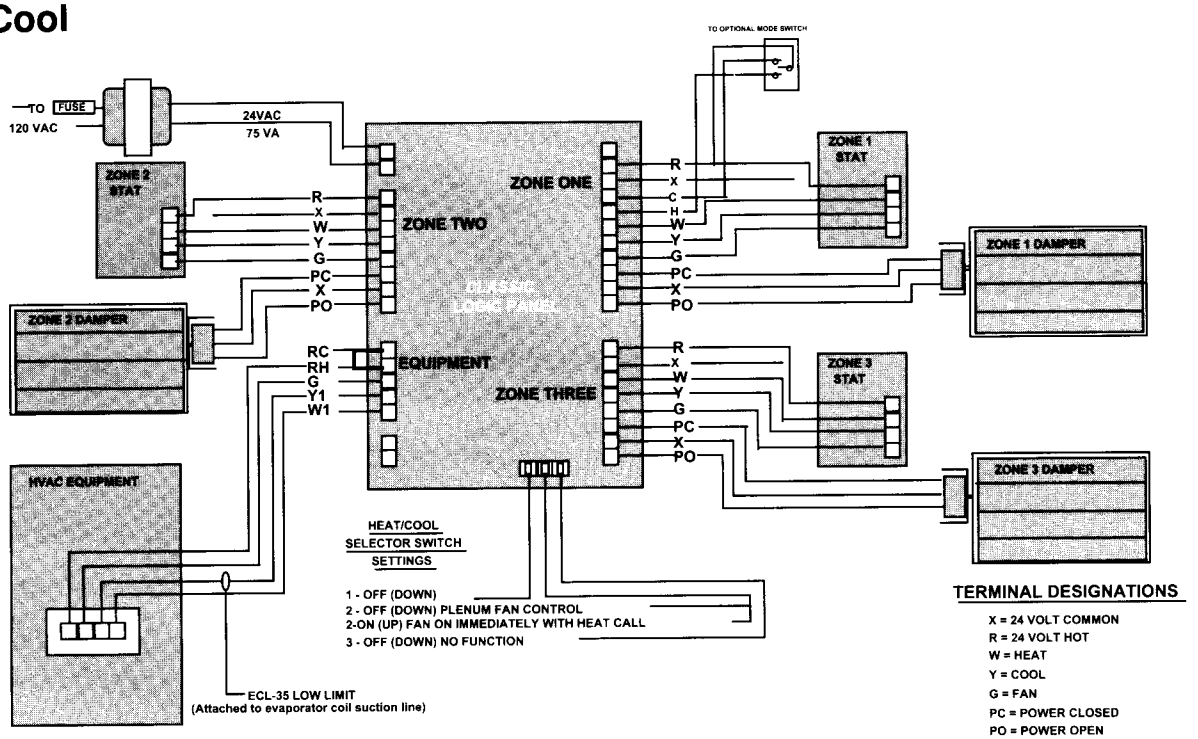
The following sequence is only applicable when the Classic system is used in heat pump applications and the system is in the Heat Only or Auto mode of operation. The auxiliary heat in heat pump systems is controlled by an internal control panel timer. Whenever the heat pump is in the heating mode, the control panel will energize the auxiliary heat output if the heating call is not satisfied within 15 minutes. Once the auxiliary heat is energized, it will remain on until the last zone calling is satisfied.

Control Operation (Add-On Heat Pump)

When the Classic is used with an add-on heat pump, it will ensure that the compressor is de-energized whenever the auxiliary heat is energized. This eliminates the need for a fossil fuel kit. In the event of a heat pump compressor failure, emergency heat is activated through an EH switch located on the control panel or through the use of an external switch wired to dedicated terminals. When the switch is in the EH position, the Y1 terminal output to the compressor will always be de-energized and the W1 terminal will automatically replace the Y1 function. The upstaging sequence will be canceled and any call for heating will energize W1.

CLASSIC WIRING DIAGRAMS

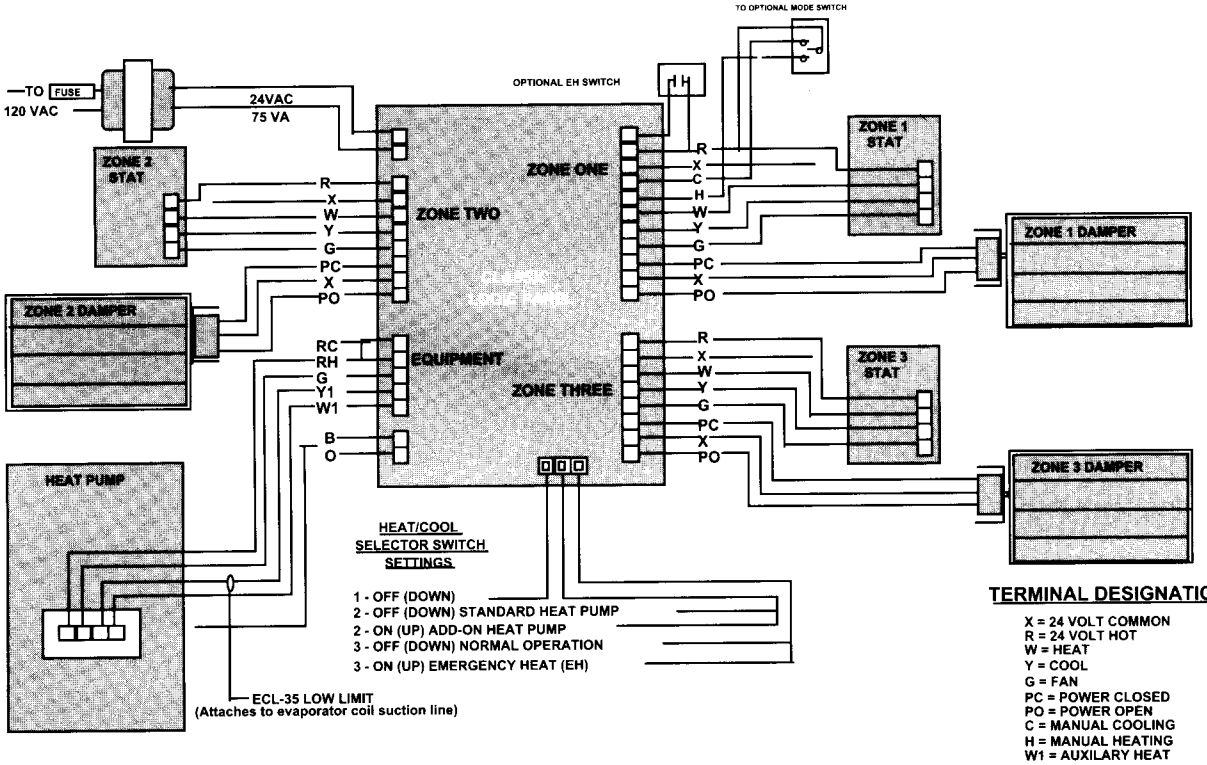
Heat/Cool



TERMINAL DESIGNATIONS

X = 24 VOLT COMMON
R = 24 VOLT HOT
W = HEAT
Y = COOL
G = FAN
PC = POWER CLOSED
PO = POWER OPEN
C = MANUAL COOLING
H = MANUAL HEATING
W1 = EQUIPMENT HEAT
Y1 = EQUIPMENT COOL

Heat Pump (Dual Fuel)



TERMINAL DESIGNATIONS

X = 24 VOLT COMMON
R = 24 VOLT HOT
W = HEAT
Y = COOL
G = FAN
PC = POWER CLOSED
PO = POWER OPEN
C = MANUAL COOLING
H = MANUAL HEATING
W1 = AUXILARY HEAT
Y1 = COMPRESSOR
B = REVERSING VALVE ENERGIZED IN HEATING

LED STATUS INDICATION

All relay outputs and system status can be verified at the logic panel and are indicated by LEDs.

REFERENCE	COLOR	LOCATION	FUNCTION
Power ON	Green	24VAC Terminal	Panel is powered
FAULT	Red	24VAC Terminal	Short in system
ZONE 1	Green	Zone 1 Terminal	Damper Open
ZONE 2	Green	Zone 2 Terminal	Damper Open
ZONE 3	Green	Zone 3 Terminal	Damper Open
G	Green	Equipment Terminal	Fan Energized
Y1	Yellow	Equipment Terminal	Cooling Energized
W1	Orange	Equipment Terminal	Heating Energized
B	Orange	Equipment Terminal	Reversing valve energized in heating
NORMAL WHEN FLASHING	Green	Upper Right Corner	Panel function normal

OPERATION CHECK LIST

Prior to power up of the Classic system, verify the following:

To Panel:

- ❑ Logic panel is wired to a dedicated 24VAC, 75VA transformer
- ❑ All wires have been tagged for easy reference
- ❑ Zone thermostats have been wired to the proper terminals
- ❑ Motorized zone dampers have been wired to the proper terminals
- ❑ HVAC equipment has been wired to the proper terminals
- ❑ Selector switches are set in the proper position

From Panel:

- ❑ Primary to 24VAC, 75 VA transformer is properly fused
- ❑ Zone thermostats have been properly wired
- ❑ Motorized zone dampers have been properly wired
- ❑ Wiring from logic panel corresponds with HVAC equipment terminals

Options:

- ❑ High Limit has been installed and adjusted
- ❑ Low Limit has been installed and adjusted
- ❑ Bypass Damper has been installed

TEST, CHECK AND START-UP

1. Disconnect the 'RC' and 'RH' wires from the logic panel equipment terminal.
2. If external Heat/Auto/Cool switch has been installed, make sure that the switch is in the AUTO position.
3. Energize the 24VAC, 75VA transformer to logic panel.
4. Confirm the following LED indications:
   - Power ON - Green Light
   - Normal When Flashing - Green Flashing Light
   - Zone 1 Damper Open - Green Light at Zone 1 Terminal
   - Zone 2 Damper Open - Green Light at Zone 2 Terminal
   - Zone 3 Damper Open - Green Light at Zone 3 Terminal
5. Place all zone thermostats in the cool mode and adjust setpoints to lowest setting.
6. Press and hold the time delay override button.
7. Confirm the following LED indications:
   - Power ON - Green Light
   - Normal When Flashing - Green Rapid Flashing Light
   - Cooling ON - Yellow Light at Equipment Terminal
   - Fan ON - Green Light at Equipment Terminal
   - All Zone Dampers Open - Green lights at Zone Terminals
8. Release the Time Delay Override Button.
9. Place all zone thermostats in the heat mode and adjust setpoints to the highest setting.
10. Press and hold the time delay override button.
11. Confirm the following LED indications:
    - Power ON - Green Light
    - Normal When Flashing - Green Rapid Flashing Light
    - Heat ON - Orange Light at Equipment Terminal
    - Fan ON - Green Light at Equipment Terminal
      (Except when plenum option is selected)
    - Reversing Valve ON - Orange Light at Equipment Terminal
      (This light will energize in all equipment heat modes)
    - All Zone Dampers Open - Green lights at Zone Terminals
12. Release the Time Delay Override Button.
13. Restore the zone thermostats to preferred mode and normal setpoints.
14. De-energize the 24VAC, 75VA power to logic panel.
15. Reconnect the 'RC' and 'RH' wires to the logic panel equipment terminal.
16. Restore 24VAC, 75VA power to logic panel.

TROUBLESHOOTING GUIDE IS ON PAGE 43

SPECIFICATION GUIDE FOR ROBERTSHAW "CLASSIC"

ZONE CONTROL SYSTEM FOR CONSTANT VOLUME HVAC APPLICATION

The contractor shall furnish and install a solid-state, microprocessor zone control logic panel as described herein.

The system shall be of the type supplied by Uni-Line North America and must meet the requirements, features and basic sequence of operation listed below.

Requirements

All wiring shall be low voltage and shall be in accordance with the National Electrical Code and local electrical codes.

- System shall be wired with not less than #18 gauge wire.
- All wires must be tagged to match logic panel terminal designations.
- Upon completion, the contractor shall conduct a total system test.
- All components, parts and assemblies as provided by the supplier shall be guaranteed against defects in materials and workmanship for a period of 12 months. Warranty service shall be provided by the mechanical contractor.

Features

Ultra slim styled, high impact plastic cabinet (8-3/4"W x 9-1/2"H x 1-3/4"D)

First call priority method of control operation

Uses any single stage thermostat (Heat pump thermostats not required)

LED indicators for all system functions

Solid-state logic panel with current limiting outputs (No replaceable fuses required)

Controls single-stage heat/cool units, single compressor heat pumps with auxiliary heat, oil, electric or dual fuel units. (Fossil fuel kits are not required when used on dual fuel applications)

Controls up to 3 zones

15 minute upstage to auxiliary heat on heat pumps. (Non-adjustable)

2 or 3 wire, two position motorized zone damper compatible

All low voltage wiring (24 Volt UL Class II)

Minimum ON/OFF times of 4 minutes with built-in short cycle protection

Minimum ON/OFF time override button

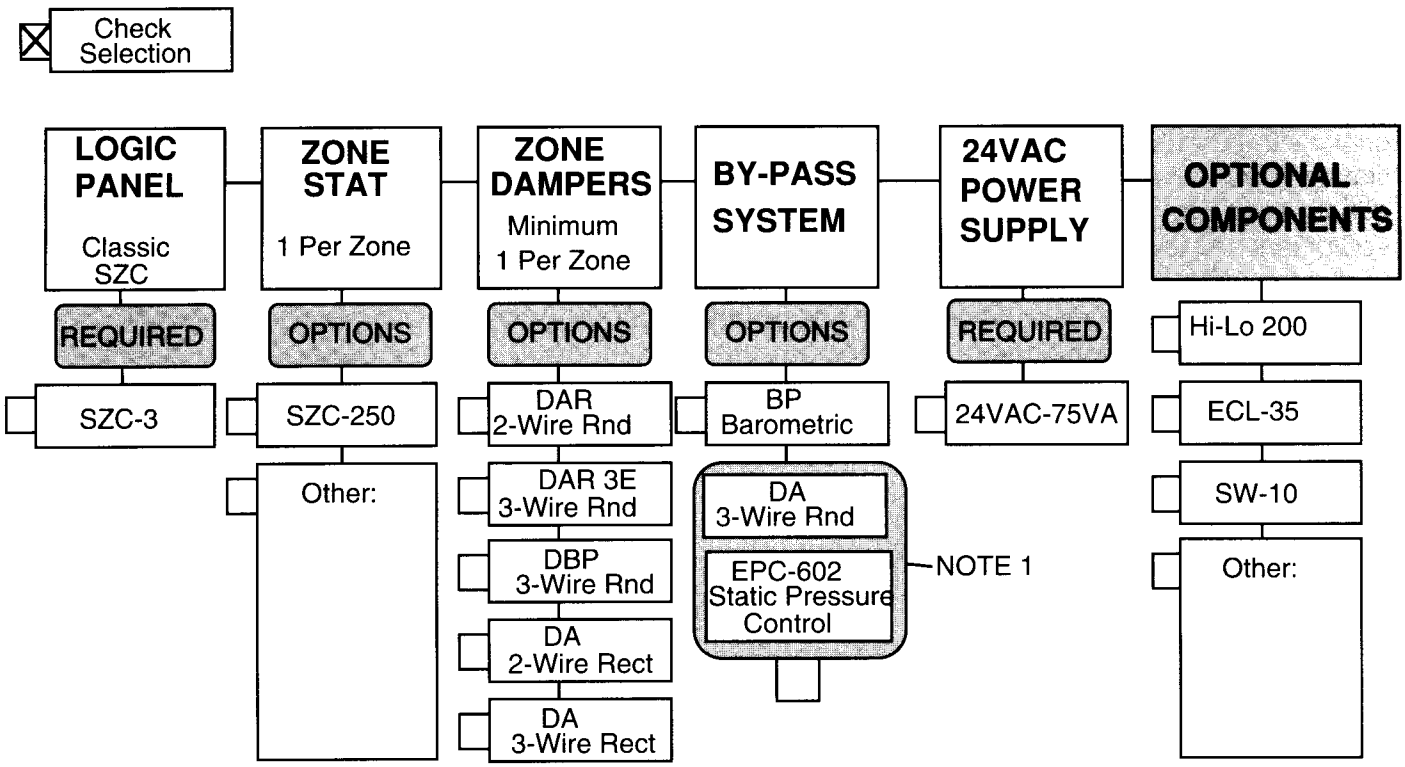
Remote Mode Selector Switch capability (Heat/Auto/Cool)

45 second fan purge into last zone(s) calling

Slide switch selector to set:

- Heat pump or Heat/Cool
- Add-On (Dual Fuel) or Normal
- Plenum fan control or fan ON with heat call
- Emergency Heat (Also assigned to EH terminal for external switch)

ZONE CONTROL SYSTEM COMPONENT SELECTION CHART



NOTE 1: If Motorized Bypass Damper is used with EPC-602 Static Pressure Control, an additional 24VAC-40VA transformer is required.

Submittal sheets for the Classic SZC Logic Panel and SZC-250 Zone Thermostat can be found on pages 27-28.

Submittal sheets for Dampers and other accessories can be found on pages 33-42, or in the Uni-Line North America Catalog.

Robertshaw "PREMIER"

General Overview

The Robertshaw Premier zone control system is designed to control conditioned air from 3 up to 19 zones in association with a single heating and cooling forced air unit. The Premier is compatible with single or multi-stage gas, electric, heat pump or dual-fuel equipment. The temperature of each zone is controlled by its own dedicated DSL-520P communicating zone thermostat and duct mounted motorized zone damper assembly which controls the distribution of conditioned air into each zone based on thermostat demand. All zone thermostats, dampers and peripherals are wired directly to the Premier logic panel. The control panel is wired to the HVAC equipment. All low voltage power for the Premier panel is provided by a single dedicated 24VAC, 75VA transformer. Power for the zone dampers is provided by separate transformer(s) based on total zone damper VA requirements as outlined in the Premier Installation/Operation Manual. Using the Premier's control panel LCD programming module, the system can be set up for virtually all HVAC equipment configurations and offers a wide latitude of customized options.

Features

Ultra slim cabinet styling

2 modes of operation: Timesharing or Differential Control

4 lines by 20 character backlit LCD display

Friendly user interface which allows access to features such as:

- Panel setup
- System programming (temperatures, schedules, 2 or 4 events per day)
- 12 or 24 hour clock
- Temperature display in Fahrenheit or Celsius
- Equipment test

LED status indicators for all system functions

Solid state control module with current limited relay outputs

Controls heat pumps, cooling units, gas, oil, electric and dual fuel equipment

Number of controlled zones expandable to 19 in increments of 2 zones by ordering the Expander module (SZEX)

Controls up to 4 stages of heating and 3 stages of cooling in heat/cool mode

Controls up to 3 stages of heating and 3 stages of cooling in heat pump mode

2 speed fan output

45 second fan purge into last zone(s) calling

Constant or automatic fan during occupied schedule

2 or 3 wire damper capability

Selectable perimeter heat control from zone thermostats

High/Low limit down staging

High/Low balance control

Minimum heating and cooling ON/OFF times (selectable)

Short cycle protection

Occupied/Unoccupied cycle capability

Manual or automatic changeover

Smoke detector input

All low voltage wiring

No batteries required (All programs remain in memory regardless of power outage duration)

General Overview *continued*

Mode of Operation

Local mode settings are request only. Calls for these modes are serviced only if the logic panel is in that mode as well. (Off/Heat/Auto/Cool)

Perimeter Heat

When the SZP logic panel is unable to service a zone requesting heating due to the equipment being energized in cooling or when the system is in the minimum OFF time, the thermostat will close its relay contact on internal terminals 'R' and 'W1' which may be used to energize a local perimeter heat source. When the logic panel energizes the equipment in the heating mode, perimeter heat is disabled. Perimeter heat is allowed only when the logic panel is set up in the Heat or Auto mode of operation. The perimeter heat relay is a 24VAC dry contact output rated at 0.75 Amps.

Constant Fan

When global constant fan is selected, all zones are in the constant fan mode regardless of the fan setting on the DSL-520P. The fan symbol appears on the thermostats LCD display when local constant fan is selected. It does not appear when the logic panel has been set up to provide global constant fan.

Temporary Temperature Override

During the Occupied period, individual zone temperature setpoints may be changed and remain valid for the duration of the Occupied period. The temporary setpoints are discarded when the logic panel changes over to the Unoccupied period. During the Unoccupied period, individual zone temperature setpoints may be changed and will remain valid for a period of 1 hour, after which the temporary setpoints will be discarded.

Minimum Equipment On Time

The DSL-520P is designed to provide equipment short cycle protection. The minimum amount of time the thermostat will call for heating or cooling may be set to either 2 or 4 minutes via an internal switch located on the back of the thermostat. This timer is initiated the moment a call is made for heating or cooling. When the equipment is energized, the minimum run time must equal both the thermostat's and the logic panel's selected minimum ON times. Timers run concurrently. The thermostat has no minimum OFF time setting.

Clock Display Format

Time may be displayed in either 12 or 24 hour format. The user simply holds both the Fan button and presses the Outdoor button to change the format.

Temperature Display Format

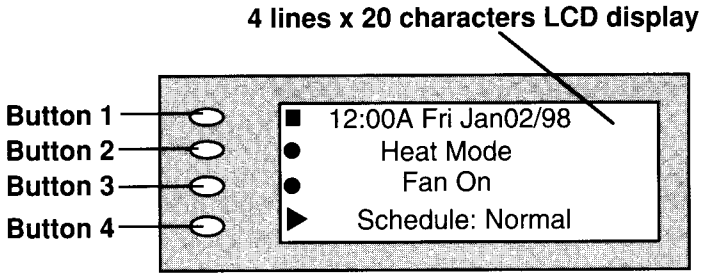
The temperature may be displayed in either Fahrenheit or Celsius. The user simply presses the setpoint Up and Down buttons simultaneously to change the format.

General Overview *continued*

System Programming

All system programming is accomplished through the Premier logic panel using the 4 button keypad and 4 line by 20 character Liquid Crystal Display. There are 3 assigned programming areas;

1. Equipment Set Up
2. Zone Thermostat Scheduling
3. Equipment Relay Output Testing



LCD Symbol Descriptions

■ Leads to other menus; further data to be entered, further options available

● Toggles between menu selections or options

▶ Forwards to next menu

◀ Backs up to previous screen or data entry completed for menu path currently in use

▲ Increases value of an item

▼ Decreases value of an item

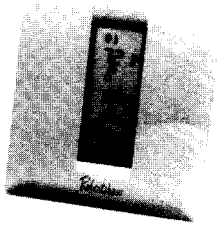
PREMIER ENVIRONMENTAL MODULE (SZEM)

The Robertshaw Environmental Module (SZEM) is an optional dedicated component for the Premier system. The module provides the following control operation through an RS485 communication port:

- Bypass Damper control and static pressure sensing
- High/Low temperature limit signaling
- Outdoor temperature measurement
  - Outdoor temperature is displayed on logic panel LCD and at all zone thermostats
  - Outdoor temperature measurement is also used for High and Low balance point settings for heat pump applications.

All information received by the SZP logic panel may be viewed by the user on the LCD display.

PREMIER DSL-520P COMMUNICATING ZONE THERMOSTAT



The DSL-520P zone thermostat is dedicated to the Premier system and can not be used as a general heating and cooling thermostat.

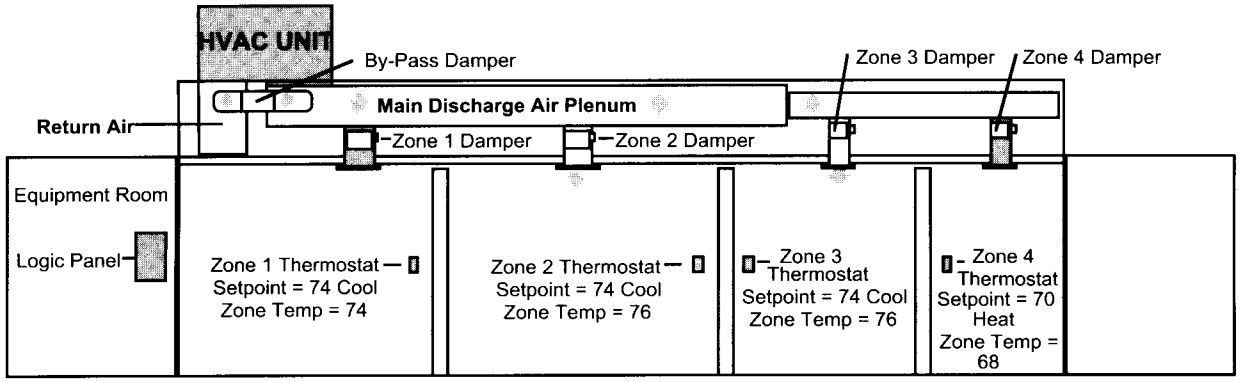
SEQUENCE OF OPERATION

Depending on the selected control algorithm (Timeshare or Differential), the sequence of operation is as follows:

Timeshare

The Timeshare control algorithm is recommended for zoning applications with less than six zones. Through the programming process, the contractor selects the minimum number of zones required to energize a given number of stages for both heating and cooling. Once a heating or cooling call from a zone or zones matches the programmed minimum number, the control panel will first open the associated zone damper(s) to allow conditioned air to be discharged into the calling zone(s). The panel will close any zone damper(s) not matching the established mode of operation. The mode of operation is established on a First Call Priority basis. The panel will energize the equipment in the proper mode of operation for a minimum (selectable from 2-8 minutes) time or until the minimum number of zones required to energize the equipment are satisfied. However, if during the first call, other zones call in the opposite mode equal to the established programmed minimums, the control panel will energize the equipment in the opposite mode of operation if all "first call" zones have not been satisfied within a fixed 20 minute time frame.

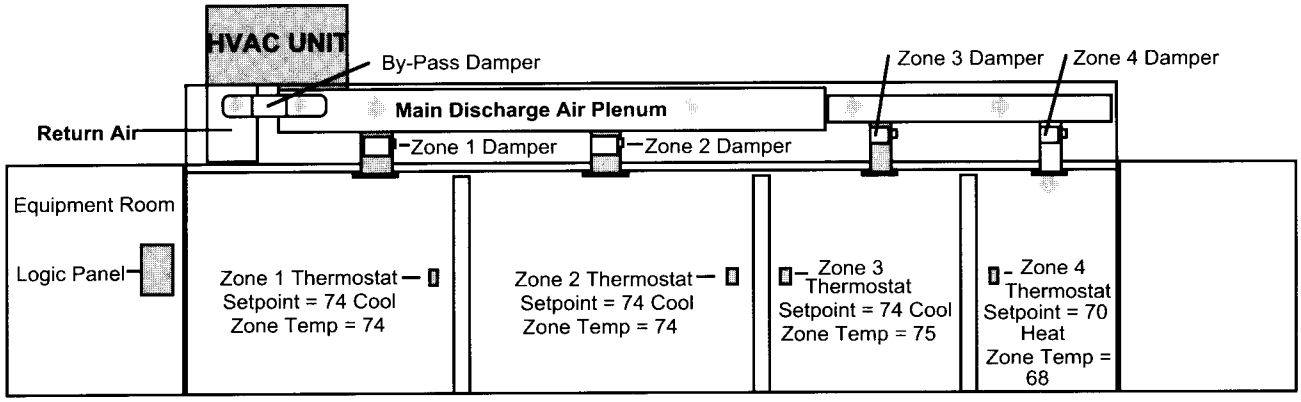
TIMESHARE MODE (Illustration 1)



The following example of Timeshare mode is based on the system being in the Auto changeover:

1. Zone 2 and 3 call for cooling first
2. Zone 1 is satisfied
3. Shortly thereafter, zone 4 calls for heating
4. The logic panel control module has been programmed to allow any one zone to energize the equipment
5. Logic panel opens zone 2 and 3 damper and closes zone 1 and 4 damper
6. The equipment is energized in the cooling mode
7. The bypass damper allows supply air to pass into the return plenum to relieve the increase in static pressure caused by zone 1 and 4 dampers being closed

TIMESHARE MODE (Illustration 2)

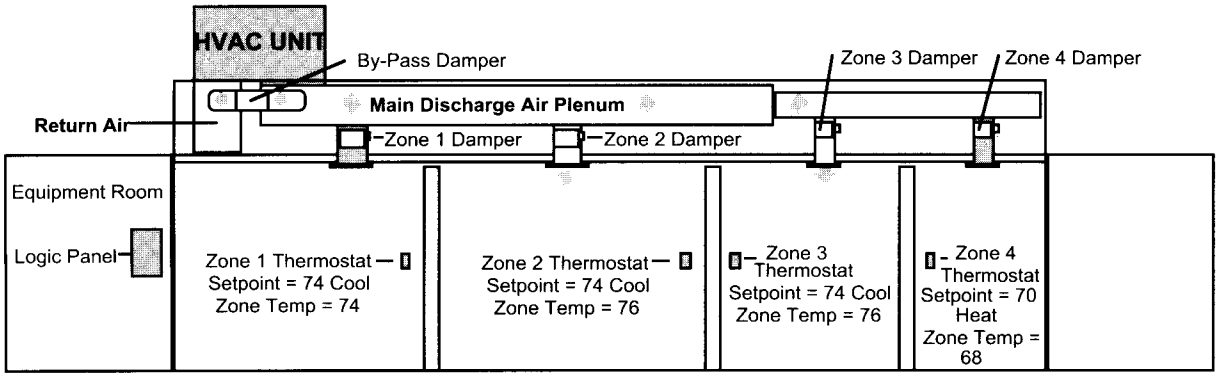


1. Upon energizing the equipment in the cooling mode, the logic panel starts a 20 minute internal timer
2. Zone 2 achieves the set point within 20 minutes but zone 3 is still calling after 20 minutes
3. Since there is an opposite call for heating in zone 4, the logic panel will changeover to the heating mode and re-initiates the 20 minute timer
4. After a 45 second fan purge into zone 2 and 3, the system will close zone 2 and 3 dampers and open zone 4 damper prior to energizing the equipment in the heating mode
5. During changeover, the system will always leave the equipment OFF for the minimum programmed time
6. Multiple stages of heating and cooling are activated every 5 minutes
7. Auxiliary heat for heat pump equipment will be energized 15 minutes after the last compressor stage

Differential Control

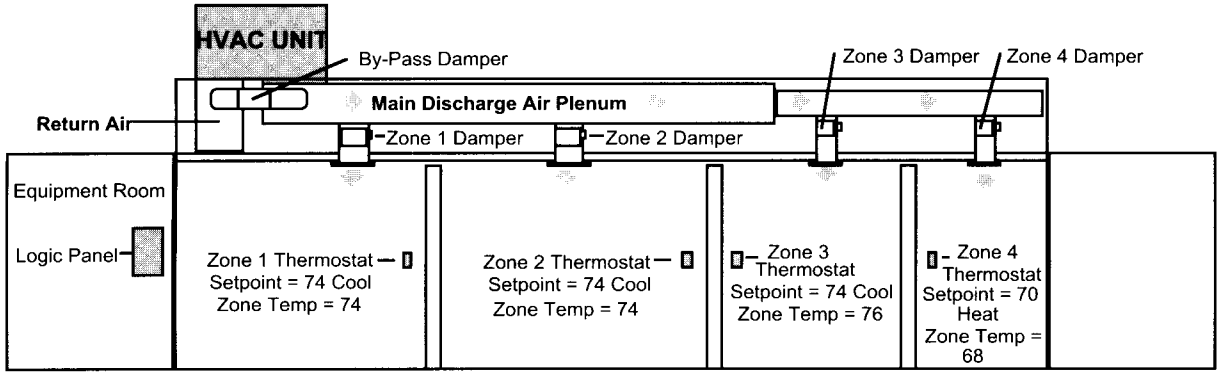
Differential control is recommended on zone control applications having from 6 to 19 zones. Although programming set up is basically the same as Timeshare, Differential Control looks at the difference in heating and cooling calls. If the difference is equal to the minimum number of zones required to energize a given number of stages, the panel will energize the equipment in the mode of operation representing the greatest difference.

DIFFERENTIAL MODE (Illustration 1)



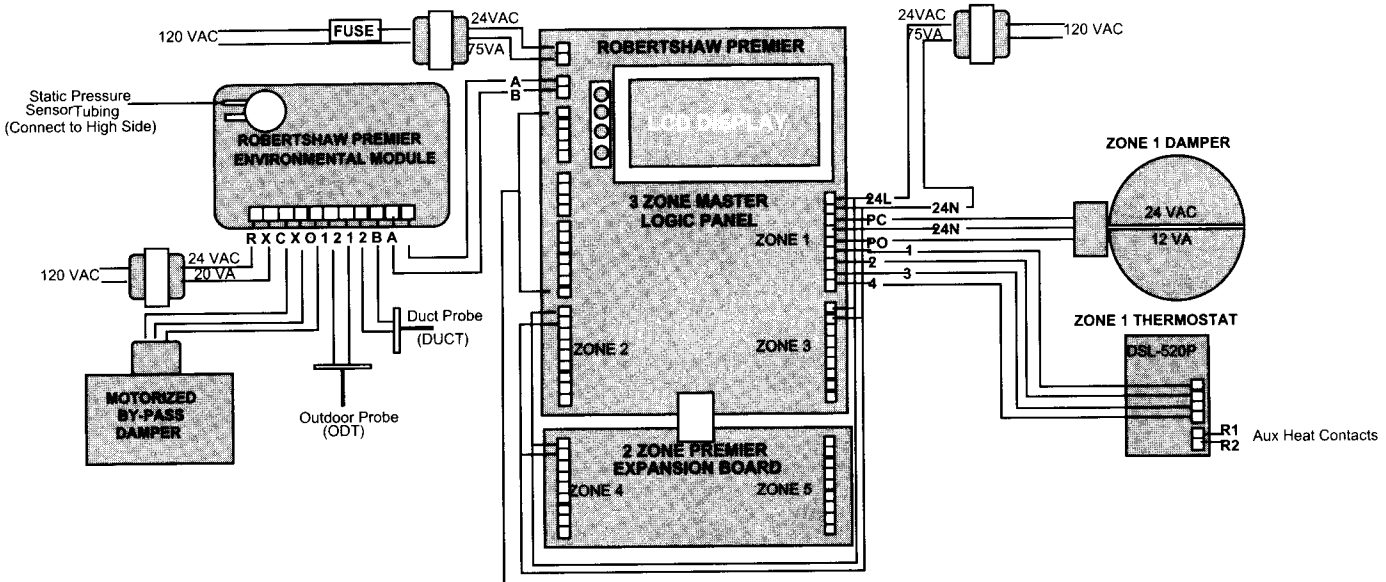
1. When the Premier system is placed in the Differential Control Mode, the minimum number of zones required to energize heating or cooling is based on a pre-programmed value.
2. In the example the program settings are 1 zone = first stage heat and 1 zone = first stage cool
3. Since zone 2 and 3 are calling for cooling and zone 4 is calling for heating, the difference is calculated
4. 2 zones calling for cooling minus 1 zone calling for heating equals ONE
5. Since One equals the minimum number of zones required to energize the equipment and cooling represents the greatest difference, the equipment will be energized in the cooling mode

DIFFERENTIAL MODE (Illustration 2)



1. Once zone 2 reaches the set point the differential changes
2. Even though zone 3 is still calling for cooling, the required minimum number of ONE is offset by zone 4 calling for heating
3. Zone 1 cool minus zone 4 heat equals ZERO
4. When the difference is less than the minimum number programmed to energize heating or cooling, the equipment will be de-energized and the system will open all zone dampers to provide ventilation air until enough calls take place to create the required differential

PREMIER WIRING DIAGRAM



EQUIPMENT WIRING

TYPICAL HEAT PUMP

W1 - 1ST STAGE HEAT
W2 - 2ND STAGE HEAT
W3 - AUXILIARY HEAT
W4 - EH (EMERGENCY HEAT)
RH - 24 VOLT HEAT RELAY

USER INSTALLED JUMPER

Y1 - 1ST STAGE COOL
Y2 - 2ND STAGE COOL
Y3 - 3RD STAGE COOL
RC - 24 VOLT COOL RELAY

B - REVERSING VALVE ENERGIZED IN HEATING
O - REVERSING VALVE ENERGIZED IN COOLING

G1 - 1ST SPEED FAN
G2 - 2ND SPEED FAN

SMOKE DETECTOR INPUTS (NO CONTACTS)

TYPICAL HEAT/COOL

W1 - 1ST STAGE HEAT
W2 - 2ND STAGE HEAT
W3 - 3RD STAGE HEAT
W4 - 4TH STAGE HEAT
RH - 24 VOLT HEAT RELAY

USER INSTALLED JUMPER

Y1 - 1ST STAGE COOL
Y2 - 2ND STAGE COOL
Y3 - 3RD STAGE COOL
RC - 24 VOLT COOL RELAY

G1 - 1ST SPEED FAN
G2 - 2ND SPEED FAN

SMOKE DETECTOR INPUTS (NO CONTACTS)

TERMINAL DESIGNATIONS

24L = 24 VOLT LINE (HOT)
24N = 24 VOLT NEUTRAL (COMMON)
W = HEAT
Y = COOL
G = FAN
PC - POWER CLOSED
PO = POWER OPEN
A/B = ENVIRONMENTAL MODULE TERMINALS
1/2/3/4 = DSL-520P WIRING TERMINALS

PROGRAMMING FLOW CHARTS

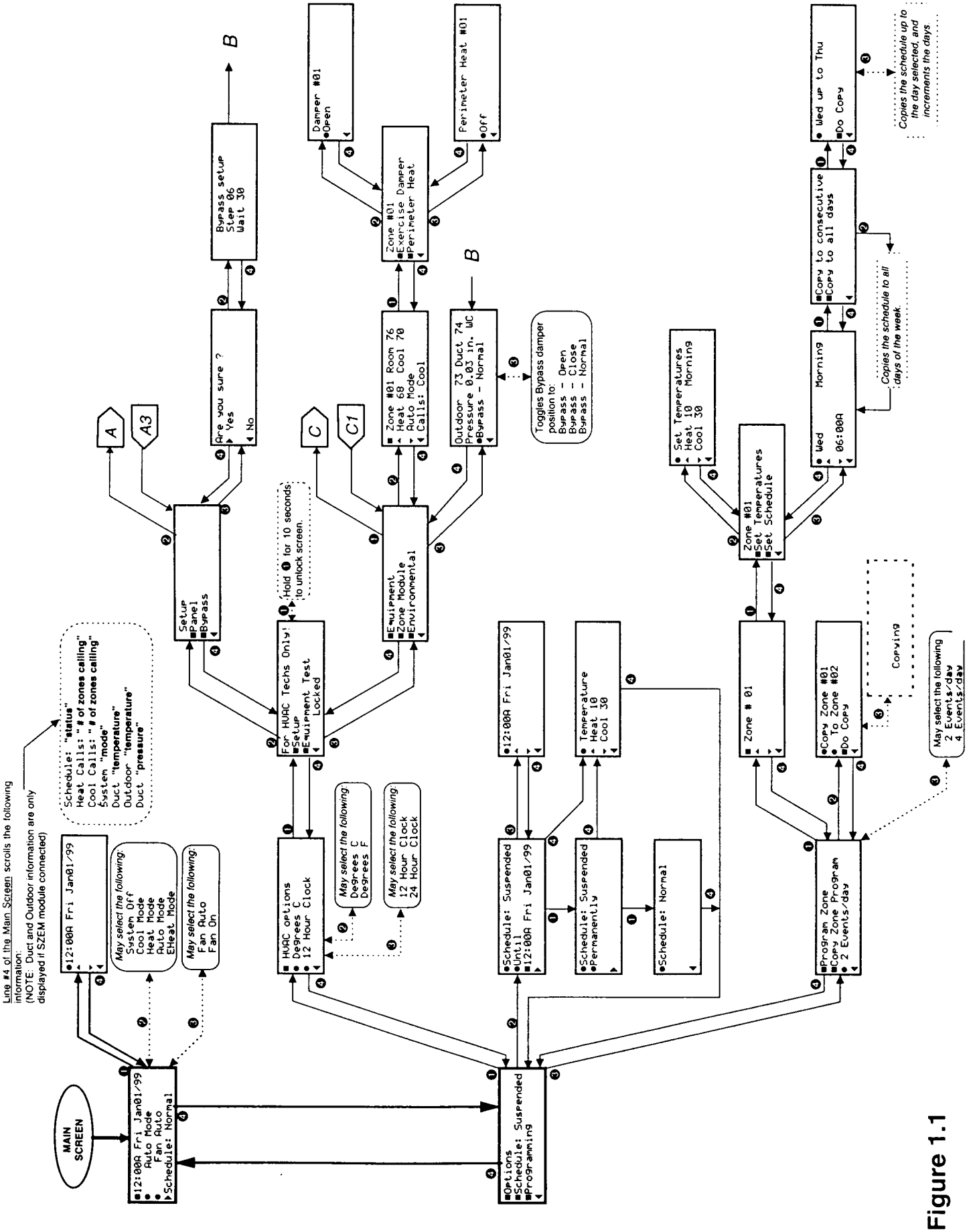


Figure 1.1

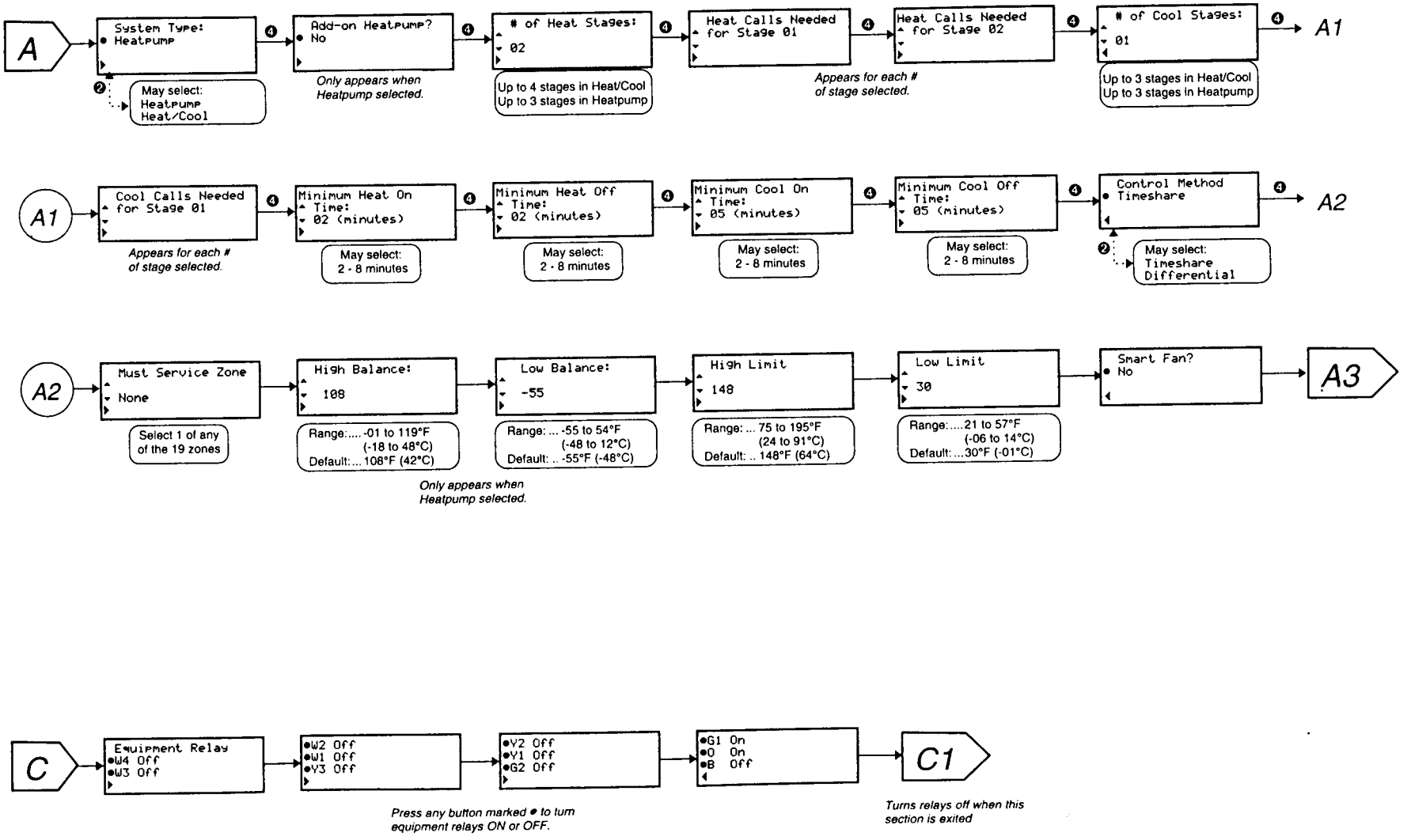

A
System Type:
Heatpump
May select:
Heatpump
Heat/Cool
Add-on Heatpump?
No
Only appears when Heatpump selected.
# of Heat Stages:
02
Up to 4 stages in Heat/Cool
Up to 3 stages in Heatpump
Heat Calls Needed for Stage 01
Heat Calls Needed for Stage 02
Appears for each # of stage selected.
# of Cool Stages:
01
Up to 3 stages in Heat/Cool
Up to 3 stages in Heatpump
A1
A1
Cool Calls Needed for Stage 01
Appears for each # of stage selected.
Minimum Heat On Time:
02 (minutes)
May select: 2 - 8 minutes
Minimum Heat Off Time:
02 (minutes)
May select: 2 - 8 minutes
Minimum Cool On Time:
05 (minutes)
May select: 2 - 8 minutes
Minimum Cool Off Time:
05 (minutes)
May select: 2 - 8 minutes
Control Method
Timeshare
May select:
Timeshare
Differential
A2
A2
Must Service Zone
None
Select 1 of any of the 19 zones
High Balance:
108
Range:.....-01 to 119°F (-18 to 48°C)
Default:...108°F (42°C)
Low Balance:
-55
Range: ... -55 to 54°F (-48 to 12°C)
Default: .. -55°F (-48°C)
Only appears when Heatpump selected.
High Limit
148
Range: ... 75 to 195°F (24 to 91°C)
Default: .. 148°F (64°C)
Low Limit
30
Range:.....21 to 57°F (-06 to 14°C)
Default: ...30°F (-01°C)
Smart Fan?
No
A3
C
Equipment Relay
•W4 Off
•W3 Off
•W2 Off
•W1 Off
•Y3 Off
•Y2 Off
•Y1 Off
•G2 Off
•G1 On
•O On
•B Off
Press any button marked • to turn equipment relays ON or OFF.
C1
Turns relays off when this section is exited

Figure 1.2

OPERATION CHECK LIST

Prior to power up of the Premier system, verify the following:

To Panel:

- ❑ Logic panel is wired to a dedicated 24VAC, 75VA transformer
- ❑ Separate 24VAC transformer(s) equal to 12VA per zone damper wired to 24 volt zone terminals as per wiring diagram
- ❑ All wires have been tagged for easy reference
- ❑ Zone thermostats have been wired to their properly assigned terminals (Confirm polarity of wiring)
- ❑ Motorized zone dampers have been wired to their properly assigned terminals
- ❑ HVAC equipment has been wired to the proper assigned terminals
- ❑ All other peripherals have been wired to their assigned terminals

From Panel:

- ❑ Primaries from all 24VAC transformers are properly fused
- ❑ Zone thermostats have been properly wired (Confirm polarity of wiring)
- ❑ Motorized zone dampers have been properly wired
- ❑ Wiring from logic panel corresponds with HVAC equipment terminals

Optional SZEM Environmental Module:

- ❑ SZEM is properly wired to dedicated terminals on logic panel (Confirm polarity of wiring)
- ❑ SZEM is wired to a dedicated 24VAC (minimum 20VA) transformer
- ❑ Motorized Bypass damper is wired to proper SZEM terminals
- ❑ Discharge air sensor is wired to proper SZEM terminals
- ❑ Outdoor air sensor is wired to proper SZEM terminals
- ❑ Static pressure tubing is properly connected to the SZEM and installed in the main discharge air plenum as per installation instructions

TEST, CHECK AND START-UP

1. Disconnect the RC and RH wire from the logic panel equipment terminals to establish panel functionality first.
2. Energize the 24VAC, 75VA logic panel transformer
3. Energize the 24VAC transformer(s) powering the zone dampers
4. Energize the SZEM Environmental Module transformer (Optional)
5. After power up, confirm the following configuration at the logic panel LCD
   - Auto Mode
   - Fan Auto
   - Schedule: Suspended
   - Heat/Cool System
   - 1 Heat/1 Cool stages
6. Observe the condition of the following logic panel LEDs :

   Confirm that the W, Y and G LEDs at each logic panel zone terminal having a zone thermostat are not all ON. If they are, panel and thermostat are not communicating. Check wiring for proper polarity. All logic panel terminals not wired to a zone thermostat will have all assigned LEDs ON.

   NOTE: When proper communication is established, the satellite dish symbol should appear on the zone thermostat LCD and the uplink symbol should flash occasionally. (See DSL-520P zone thermostat instruction manual for symbol reference)
7. If Optional SZEM Environmental Module is installed, confirm that the "Normal When Flashing" LED is flashing and that the "Module Connected" LED is ON.
8. Confirm that equipment outputs are not conflicting. W and Y LEDs should never be on at the same time.

   NOTE: On initial power up, the logic panel will not respond to equipment calls for a period of 4 minutes. Constant fan requests would be recognized.

TROUBLESHOOTING GUIDE IS ON PAGE 43

SPECIFICATION GUIDE FOR ROBERTSHAW "PREMIER"

ZONE CONTROL SYSTEM FOR CONSTANT VOLUME HVAC APPLICATION

The contractor shall furnish and install a solid-state, microprocessor zone control logic panel as described herein.

The system shall be of the type supplied by Uni-Line North America and must meet the requirements, features and basic sequence of operation listed below.

Requirements

All wiring shall be low voltage and shall be in accordance with the National Electrical Code and local electrical codes.

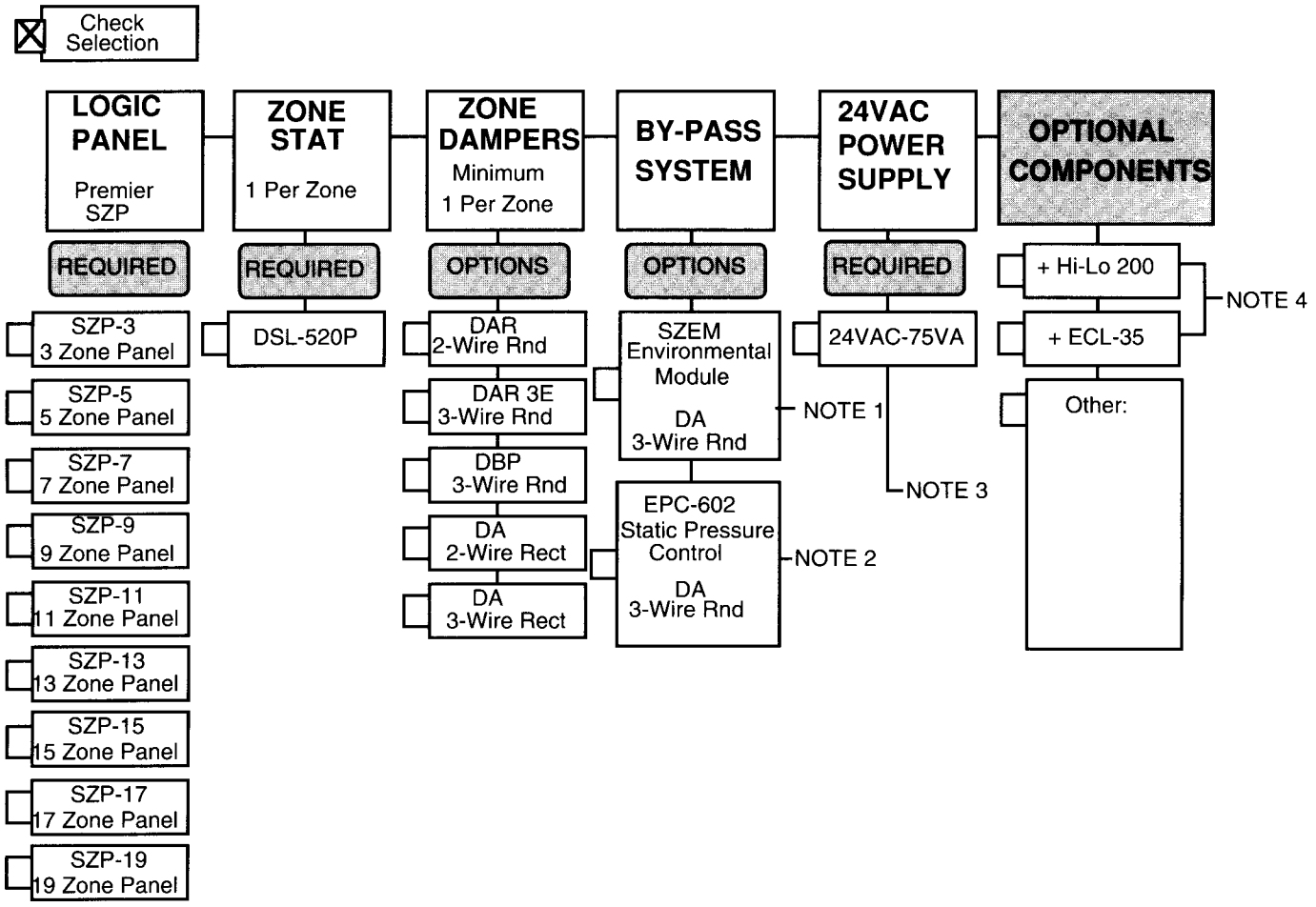
- System shall be wired with not less than #18 gauge wire.
- All wires must be tagged to match logic panel terminal designations.
- Upon completion, the contractor shall conduct a total system test.
- All components, parts and assemblies as provided by the supplier shall be guaranteed against defects in materials and workmanship for a period of 12 months. Warranty service shall be provided by the mechanical contractor.

Features

Ultra slim styled cabinet
2 modes of operation: Timesharing or Differential Control
4 lines by 20 character backlit LCD display
Friendly user interface which allows access to features such as:
    Panel setup
    System programming (temperatures, schedules, 2 or 4 events per day)
    12 or 24 hour clock
    Temperature display in Fahrenheit or Celsius
    Equipment test
LED status indicators for all system functions
Solid state control module with current limited relay outputs
Controls heat pumps, cooling units, gas, oil, electric and dual fuel equipment
Number of controlled zones expandable to 19 in increments of 2 zones by ordering the Expander module (SZEX)
Controls up to 4 stages of heating and 3 stages of cooling in heat/cool mode
Controls up to 3 stages of heating and 3 stages of cooling in heat pump mode
2 speed fan output
45 second fan purge into last zone(s) calling
Constant or automatic fan during occupied schedule
2 or 3 wire damper capability
Selectable perimeter heat control from zone thermostats
High/Low limit down staging
High/Low balance control
Minimum heating and cooling ON/OFF times (selectable)
Short cycle protection
Occupied/Unoccupied cycle capability
Manual or automatic changeover
Smoke detector input
All low voltage wiring
No batteries required (All programs remain in memory regardless of power outage duration)

Robertshaw "PREMIER"

ZONE CONTROL SYSTEM COMPONENT SELECTION CHART



NOTE 1: If SZEM Environmental Module is used, an additional 24VAC-20VA transformer is required.

NOTE 2: If Motorized Bypass Damper is used with EPC-602 Static Pressure Control, an additional 24VAC-40VA transformer is required.

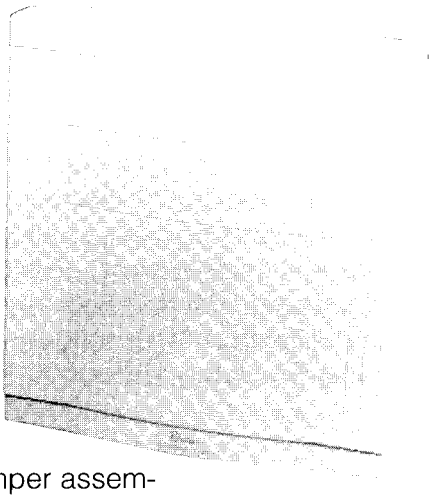
NOTE 3: The Premier logic panel required a separate 24VAC-75VA transformer. Additional transformer(s) will be required for zone damper power. Use 12VA per zone damper in calculating transformer requirements. Do not exceed UL Class II on any 24 volt power supply.

Submittal sheets for the Premier SZP Logic Panel, SZEX Expander Module, SZEM Environmental Module and DSL-520P Thermostat can be found on pages 29-32.

Submittal sheets for Dampers and other accessories can be found on pages 33-42, or in the Uni-Line North America Catalog.

Robertshaw "CLASSIC"

SZC LOGIC PANEL SUBMITTAL SHEET



The Robertshaw (SZC) Classic zone control system is designed to control conditioned air in up to 3 zones using a single heating and cooling unit. The system is compatible with both single stage heating and cooling units, single compressor heat pumps with auxiliary heat and dual fuel equipment. The temperature for each zone is controlled by an individual thermostat. Thermostat selection can be electromechanical, solid state non-programmable or solid state programmable. Zone thermostats only need to be single stage, heat/cool regardless of the equipment configuration. Air distribution to each zone is controlled by associated duct mounted motorized damper assemblies. All zone thermostats and dampers are wired directly to the logic panel via dedicated zone terminal blocks. The logic panel is wired to the HVAC equipment. Power for the zone thermostats and motorized zone dampers is provided through the logic panel. A dedicated 24VAC, 75VA transformer is required.

Features

- Ultra slim styled, high impact plastic cabinet (8-3/4"W x 9-1/2"H x 1-3/4"D)
- First call priority method of control operation
- Uses any single stage thermostat (Heat pump thermostats not required)
- LED indicators for all system functions
- Solid-state logic panel with current limiting outputs (No replaceable fuses required)
- Controls single-stage heat/cool units, single compressor heat pumps with auxiliary heat, oil, electric or dual fuel units. (Fossil fuel kits are not required when used on dual fuel applications)
- Controls up to 3 zones
- 15 minute upstage to auxiliary heat on heat pumps (Non-adjustable)
- 2 or 3 wire, two position motorized zone damper compatible
- All low voltage wiring (24 Volt UL Class II)
- Minimum ON/OFF times of 4 minutes with built-in short cycle protection
- Minimum ON/OFF time override button
- Remote Mode Selector Switch capability (Heat/Auto/Cool)
- 45 second fan purge into last zone(s) calling
- Slide switch selectors to set:
  - Heat pump or Heat/Cool
  - Add-On (Dual Fuel) or Normal
  - Plenum fan control or fan ON with heat call
  - Emergency Heat (Also assigned to EH terminal for external switch)

Specifications

Dimensions

8-3/4"W x 9-1/2"H x 1-3/4"D

Power Requirements

24 VAC ± 10%
75 VA UL Class II transformer

Panel Construction

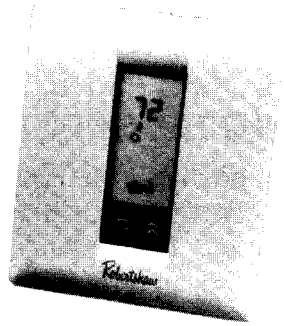
High impact injection molded plastic
Removable access door
1/2" conduit knockouts

Operating Ambient

32 to 131°F

Robertshaw "CLASSIC"

SZC-250 ZONE THERMOSTAT SUBMITTAL SHEET



The Robertshaw SZC-250 zone thermostat is designed to be used with the "Classic" logic panel. The thermostat is engineered to provide unsurpassed temperature control technology and is creatively packaged in an ultra-slim white case designed to blend harmoniously with any interior. The SZC-250 utilizes the most advanced state-of-the-art surface mount manufacturing techniques and offers user-friendly control of heating and air conditioning through the use of a unique Ultra-Touch keypad and informative, easy-to-read LCD.

Features

- Designed for today's interiors
- Environment friendly - mercury free and does not require batteries
- Electronic keypad and/or lockable cover prevent tampering
- Built-in equipment protection under normal operating conditions
- Day/Night button provides alternate temperature settings
- Optional remote indoor temperature sensor
- Optional outdoor temperature sensor
- Selectable Celsius or Fahrenheit temperature display

Specifications

Dimensions

4-1/2"H x 4"W x 7/8"D

Display

LCD

Measurement Range

38 to 109 °F

Terminal Designations

R,W,Y,G
RS2-RS1-RS+V (Optional Remote Sensor)

Control Range

Heating -41 to 96°F
Cooling -43 to 98°F

Control Accuracy

± 1 °F

Limits

Mechanical locking kit to prevent keyboard access
Electronic lock to limit temperature adjustment
(± 3°F from established set points)

Robertshaw "PREMIER"

SZP LOGIC PANEL SUBMITTAL SHEET

The Robertshaw Premier system is designed to control conditioned air from 3 up to 19 zones in association with a single heating and cooling forced air unit. The Premier is compatible with single or multi-stage gas, electric, heat pump or dual-fuel equipment. The temperature of each zone is controlled by its own dedicated DSL-520P communicating zone thermostat and duct mounted motorized zone damper assembly which controls the distribution of conditioned air into each zone based on thermostat demand. All zone thermostats, dampers and peripherals are wired directly to the Premier logic panel. The control panel is wired to the HVAC equipment. All low voltage power for the Premier panel is provided by a single dedicated 24VAC, 75VA transformer. Power for the zone dampers is provided by separate transformer(s) based on total zone damper VA requirements as outlined in the Premier Installation/Operation Manual. Using the Premier's control panel LCD programming module, the system can be set up for virtually all HVAC equipment configurations and offers a wide latitude of customized options.

Features

- Ultra slim styled cabinet
- 2 modes of operation: Timesharing or Differential Control
- 4 lines by 20 character backlit LCD display
- Friendly user interface which allows access to features such as:
  - Panel setup
  - System programming (temperatures, schedules, 2 or 4 events per day)
  - 12 or 24 hour clock
  - Display in Fahrenheit or Celsius
  - Equipment test
- LED (light emitting diode) status indicators for all system functions
- Solid state control module with current limited relay outputs
- Controls heat pumps, cooling units, gas, oil, electric and dual fuel equipment
- Number of controlled zones expandable to 19 in increments of 2 zones by ordering the Expander module (SZEX)
- Controls up to 4 stages of heating and 3 stages of cooling in heat/cool mode
- Controls up to 3 stages of heating and 3 stages of cooling in heat pump mode
- 2 speed fan output
- 45 second fan purge into last zone(s) calling
- Constant or automatic fan during occupied schedule
- 2 or 3 wire damper capability
- Selectable perimeter heat control from zone thermostats
- High/Low limit down staging
- High/Low balance control
- Minimum heating and cooling ON/OFF times (selectable)
- Short cycle protection
- Occupied/Unoccupied cycle capability
- Manual or automatic changeover
- Smoke detector input
- All low voltage wiring
- No batteries required (All programs remain in memory regardless of power outage duration)

Specifications

Dimensions

8-3/4"W x 9-1/2"H x 1-3/4"D

Power Requirements

24 VAC ± 10%
75 VA UL Class II transformer

Panel Construction

High impact injection molded plastic
Removable access door
1/2" conduit knockouts

Operating Ambient

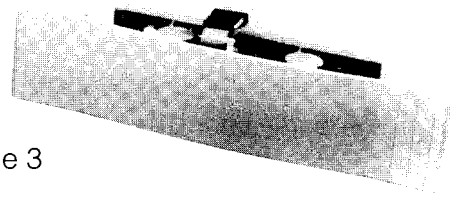
32 to 131 °F

Compliance

This equipment, if installed in strict accordance with the manufacturer's instructions, complies with the limits for a Class B computing device pursuant to Subpart J or Part 15 of FCC rules. This equipment, if installed in strict accordance with the manufacturer's instructions, complies with CE rules.

Robertshaw "PREMIER"

SZEX EXPANDER MODULE SUBMITTAL SHEET



The Robertshaw "Premier" 2 zone Expander Module (SZEX) is a modular expansion package designed to add 2 zones to the "Premier" master logic panel. Up to eight modules may be connected to the 3 zone SZP master panel allowing a total of 19 zones.

Specifications

Dimensions

8-3/4"W x 2"H x 1-3/4"D

Power Requirements

Receives power from SZP master logic panel through plug-in ribbon connection

Panel Construction

High impact injection molded plastic
Module snap-locks on to SZP master logic panel
Interlocking removable access door

Operating Ambient

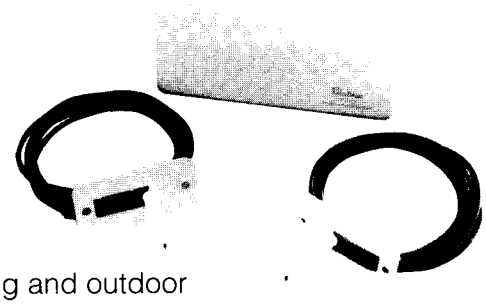
32 to 131°F

Compliance

This equipment, if installed in strict accordance with the manufacturer's instructions, complies with the limits for a Class B computing device pursuant to Subpart J or Part 15 of FCC rules. This equipment, if installed in strict accordance with the manufacturer's instructions, complies with CE rules.

Robertshaw "PREMIER"

ENVIRONMENTAL MODULE (SZEM) SUBMITTAL SHEET



The Robertshaw "Premier" Environmental Module (SZEM) compliments the "Premier" zone control system. Information collected by the SZEM is transmitted to the "Premier" panel via an RS485 communication port. This optional component provides an interface for automatic bypass damper set up and control through the "Premier" logic panel as well as high/low temperature limit signaling and outdoor temperature measurement. The complete package includes the solid-state module, mounting hardware, outdoor and discharge air sensors as well as static pressure tubing and insertion probe.

Features

- Bypass damper control and static pressure sensing
- High/Low temperature limit signaling
- Outdoor temperature measurement
- Discharge air temperature signaling
- Static pressure signaling in " W.C.
- High/Low balance point signaling for heat pump applications

Specifications

Dimensions

4"H x 5-3/4"W x 1"D

Data Exchange

RS485 communication port

Wiring

#18-2 thermostat wire to "Premier" logic panel

Power Requirements

Requires separate 24VAC-20VA transformer to control motorized bypass damper

Construction

High impact injection molded plastic

Operating Ambient

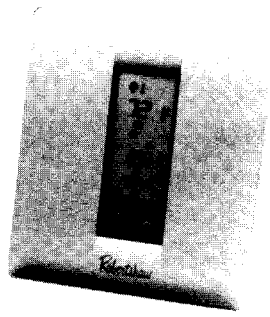
32 to 131°F

Compliance

This device, if installed in strict accordance with the manufacturer's instructions, complies with the limits for a Class B computing device pursuant to Subpart J or Part 15 of FCC rules. This device, if installed in strict accordance with the manufacturer's instructions, complies with CE rules.

Robertshaw "PREMIER"

DSL-520P COMMUNICATING THERMOSTAT SUBMITTAL SHEET



The DSL-520P zone thermostat is the exclusive thermostat used with the Premier (SZP) system. The thermostat will not function as a stand-alone temperature control. The DSL-520P is a fully communicating thermostat that is powered by the SZP logic panel and is constantly sending and receiving data through a communications interface. The DSL-520P is a highly advanced solid-state microprocessor and uses an adaptive control algorithm based on fuzzy logic to determine the heating and cooling load of the zoned area in which it is installed. The control algorithm calculates the load by evaluating constant room conditions and intelligently responds to heating and cooling demands. The DSL-520P is wired to the SZP "Premier" logic panel with conventional #18-4 thermostat wire.

Features

Non-programmable (programming is initiated through the SZP "Premier" logic panel)

Power to the DSL-520P is provided by the SZP "Premier" logic panel

User friendly keypad provides access to system parameters such as fan control, mode of operation, outdoor temperature and zone identification

Selectable Celsius or Fahrenheit temperature display

Selectable 12 or 24 hour clock display

Constant fan or automatic fan operation

Keypad lockout to prevent tampering

No batteries required

Minimum ON/OFF times (2 or 4 minutes, selectable)

Temporary temperature override (unlimited during occupied schedule and 1 hour during unoccupied times)

Perimeter heat terminals located on thermostat (provide perimeter heat when equipment is in cooling mode)

Specifications

Dimensions

4-1/2"H x 4"W x 7/8"D

Display

LCD

Measurement Range

38 to 109°F

Limits

Mechanical locking kit to prevent keyboard access
Electronic lock to limit temperature adjustment
(± 3°F from programmed set points)

Terminal Designations

1-2-3-4, W1-R (Perimeter heat)
RS2-RS1-RS+V (Optional Remote Sensor)

Control Range

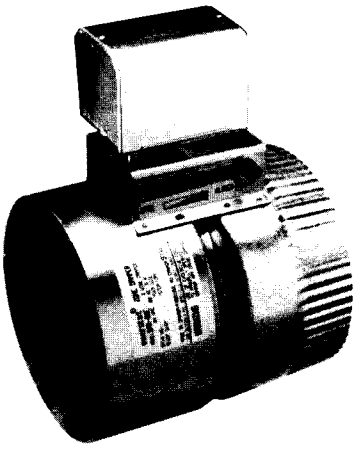
Heating -41 to 96°F
Cooling -43 to 98°F

Control Accuracy

± 1 °F

Robertshaw

DAR SERIES ZONE DAMPERS SUBMITTAL SHEET



Robertshaw DAR Series Round Control Dampers are designed to be used in zone control system applications and for the control of air flow in any low pressure duct system. Dampers are designed to work with pressure systems up to 1.2" W.C. All DAR damper shells are constructed of rolled 26 gauge galvanized steel with stiffening ribs to maintain rigidity. A single 18 gauge offset blade is attached to a 3/8" diameter one-piece steel shaft which is attached to nylon bearings for smooth operation. DAR dampers are powered by a single stall type motor providing 55 to 75 inch ounces of torque. Motor mounts are welded to the damper shell. Minimum blade adjustment is provided by an external locking mechanism. Dampers are spring open/power close and contain a "Lost Motion" braking system that prevents backlash and shock to the motor gears, bearings and blade shaft when the damper is driven open by the spring return.

Features

- Sizes from 5" to 14" diameters
- Heavy duty reinforced galvanized steel shell
- Motor mount welded to shell
- 18 gauge offset blade
- Nylon bearings for smooth operation
- 2-wire stall type 24 VAC-12VA motor
- Direct coupled actuator
- Motor cover with wiring strain relief insert

Specifications

Sizes

5", 6", 8", 10", 12" ,14"
Damper length is the diameter plus 3/4"
(The 5" dampers are the exception to this rule - their length is 6-3/4".)

Operation

Damper opens with a 90 degree turn of the blade.
Motor drives the blade closed in 15 seconds
Spring return opens blade within 5 seconds

Electrical

Synchronous type 24 VAC, 60Hz, 6 Watt, 12VA impedance protected

Options

Available in Spring Return Closed/Power Open

Robertshaw

DAR-E3 SERIES 3-WIRE ZONE DAMPERS SUBMITTAL SHEET

Robertshaw DAR-E3 Series Round Control Dampers are designed to be used in zone control system applications and for the control of air flow in low pressure duct systems. Dampers are designed to work with pressure systems up to 1.2" W.C. All DAR-E3 damper shells are constructed of rolled 26 gauge galvanized steel with stiffening ribs to maintain rigidity. A single 18 gauge offset blade is attached to a 3/8" diameter one-piece steel shaft which is attached to nylon bearings for smooth operation. DAR-E3 dampers are powered by double stacked stall type motors providing 180 inch ounces of torque. Motor mounts are welded to the damper shell. Minimum blade adjustment is provided by an external locking mechanism.

Features

Sizes from 5" to 14" diameters

Heavy duty reinforced galvanized steel shell

Motor mount welded to shell

18 gauge offset blade

Nylon bearings for smooth operation

Adjustable external minimum position

3-wire stacked stall type 24 VAC motors

Direct coupled actuator

Power consumption is 4 watts at 24 VAC

Blade rotation is 90 degrees in 50 seconds

Specifications

Sizes

5", 6", 8", 10", 12", 14"
Damper length is the diameter plus 3/4"
(The 5" dampers are the exception to this rule - their length is 6-3/4".)

Operation

Damper opens with a 90 degree turn of the blade
Motor drives the blade open and closed in 50 seconds

Electrical

Synchronous stacked stall type 24 VAC, 60Hz, 4 watts, impedance protected

Robertshaw

DBP SERIES ZONE DAMPERS SUBMITTAL SHEET

Robertshaw DBP Series Round Control Dampers are designed to be used in zone control system applications as either two position control dampers in conjunction with a static pressure control for modulating bypass. The dampers are constructed of 20 gauge galvanized steel with rolled stiffening beads to provide superior rigidity. Damper shells are provided with one straight end and one crimped end with side mounted actuator. The damper blade is an elliptical design fabricated from 18 gauge galvanized steel and is equipped with a high quality edge seal for positive close-off. The blade is mounted to a solid 0.05" diameter steel shaft with brass bearing supports. No lubrication is necessary. Motor is a Kreuter MEP-5021 with direct magnetic coupled actuator having minimum and maximum end stops to limit blade rotation. A special gear disengagement feature allows positioning of the damper and/or gear train without energizing the motor.

Features

Sizes from 8" to 20" diameters

Heavy duty reinforced galvanized steel shell

Designed for static pressures up to 1.2" W.C.

High quality edge seals for positive close-off

Nominal fitting for easy installation

Blade rotation is 60 degrees

Magnetic clutch provides 50 to 75 inch pounds of torque

Low power consumption

Specifications

Sizes

8", 10", 12", 14", 16", 18", 20"
Damper length is the diameter plus 3/4"

Operation

Damper is powered in both directions and requires a 60 degree shaft rotation

Electrical

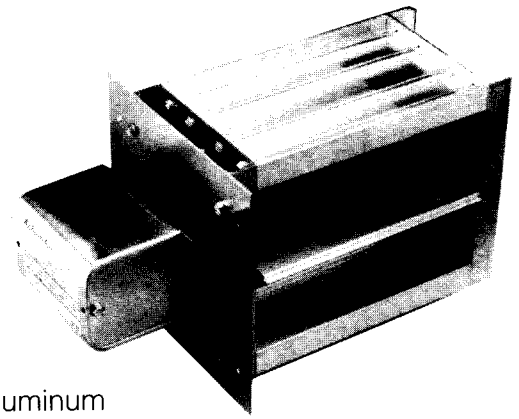
Reversible, 24 VAC, 0.160 Amps, 2.2 VA, floating type, NEMA type 1 for indoor use only

Operating Ambient

-40 to 140 °F

Robertshaw

DA SERIES ZONE DAMPERS SUBMITTAL SHEET



Robertshaw DA Series 2-wire Rectangular Control Dampers are designed to be used in zone control system applications and for the control of air flow in low pressure duct systems. Dampers are engineered to work with pressure systems up to 1.2" W.C. All DA damper frames are constructed of heavy gauge extruded aluminum and have a galvanized steel mounting plate. Extruded aluminum blades are attached to 1/2" diameter octagonal solid aluminum shafts which are supported by nylon bushings for smooth operation. DA dampers are powered by a single stall type motor providing 50 to 75 inch ounces of torque. Minimum blade adjustment is provided by an external locking mechanism. Dampers are spring open/power close and contain a "Lost Motion" braking system that prevents backlash and shock to the motor gears, bearings and blade shafts when the damper is driven open by the spring return.

Features

- Standard sizes from 6" x 6" to 14" x 24"
- Heavy duty extruded aluminum frame
- Nylon bearing for smooth operation
- Adjustable external minimum blade position
- 2-wire stall type 24 VAC motor
- Direct coupled actuator
- Low power consumption
- Motor cover with wiring strain relief insert

Specifications

Sizes

6" x 6" to 14" x 24"

Operation

Damper opens with a 90 degree turn of the blade
Motor drives the blade closed in 15 seconds
Spring return opens blade within 5 seconds

Electrical

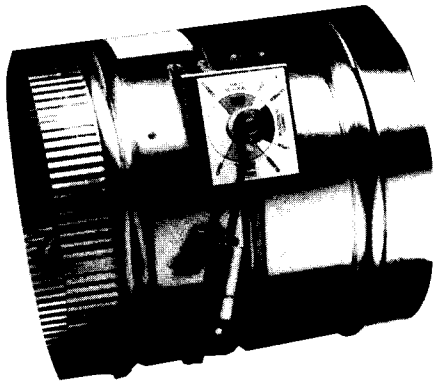
Synchronous type 24 VAC, 60Hz, 6 Watt, 12VA impedance protected

Options

Available in Spring Return Closed/Power Open
Custom sizes available to 36" x 36"

Robertshaw

BP SERIES BYPASS DAMPERS SUBMITTAL SHEET



Robertshaw BP Series Non-Electric Bypass Dampers are designed for use with forced air constant volume zone control systems requiring bypass air to maintain proper static pressure. BP dampers are available in two sizes and can be used with HVAC equipment with capacities of up to 5 tons of cooling. The BP Series bypass damper can be installed in either a vertical or horizontal position and can be set up for any air flow direction.

Features

- Easy to install and adjust
- Sturdy construction
- Can be mounted vertical or horizontal
- Positive sealed blade close-off
- No wiring
- Reversible design allows for set up of any air flow direction

Specifications

Sizes

BP-10 (10" diameter for up to 3.5 cooling tons)
BP-12 (12" diameter for up to 5.0 cooling tons)

Robertshaw

DA SERIES 3-WIRE DAMPERS SUBMITTAL SHEET

Robertshaw DA Series 3-wire Rectangular Control Dampers are designed to be used in zone control system applications and the control of air flow in low pressure duct systems. Dampers are designed to work with pressure systems up to 1.2 W.C. All DA 3-wire damper frames are constructed of heavy gauge extruded aluminum and incorporate a galvanized steel mounting plate. Extruded aluminum blades are attached to 1/2" diameter octagonal solid aluminum shafts which are supported by nylon bushings for smooth operation.

Features

Standard sizes from 6" x 6" to 14" x 24"

Heavy duty extruded aluminum frame

Nylon bushings for smooth operation

Adjustable external minimum blade position

3-wire stacked stall type 24 VAC motors

Direct coupled actuator

Low power consumption

Blade rotation is 90 degrees

55 inch ounces of torque

Specifications

Sizes

6" x 6" to 36" x 22"

Operation

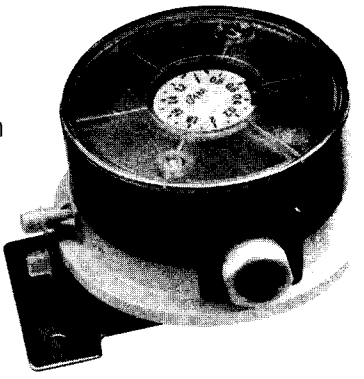
Damper opens with a 90 degree turn of the blade
Motor drives the blade open and closed in 35 seconds

Electrical

Synchronous stacked stall type 24 VAC, 60 Hz, 4 watts, impedance protected

Robertshaw

EPC-602 SERIES STATIC PRESSURE CONTROL SUBMITTAL SHEET



The Robertshaw EPC-602 Static Pressure Controller is designed for use with motorized zone control bypass dampers and can measure static pressure down to 0.2" W.C. The control can be mounted conveniently in either a vertical or horizontal position. A bright LED facilitates static pressure control set up and confirms whether the bypass damper is powered open or closed. A single 24 VAC transformer is required to power the EPC-602 and motorized bypass damper. Wiring is made directly to lug terminals located behind the removable front cover. The EPC-602 incorporates a rotating ring with conduit connector for easy wiring. The housing is molded of durable ABS plastic. The complete package includes mounting hardware, tubing and static pressure probe.

Features

- Easy to install
- Easy to set up
- Built-in LED indication for damper direction
- Can be mounted vertical or horizontal
- Rotating conduit ring
- Complete package

Specifications

Pressure Range

0.2" to 2.0" W.C.

Pressure Connection

1/4" I.D. flexhose

Minimum Contact Distance

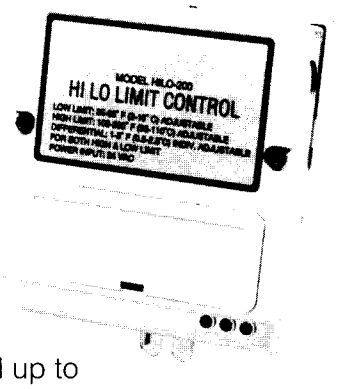
0.05" W.C. (Adjustable)

Maximum Switching Current

3 Amps @ 24 VAC

Robertshaw

HI-LO 200 SERIES LIMIT CONTROL SUBMITTAL SHEET



The Robertshaw HI-LO 200 is a solid state analog control designed to be incorporated with Robertshaw zone control systems to prevent coil freeze up caused by bypass air and at the same time control total heating discharge temperatures to prevent overshoot and/or high head pressures when used with heat pump systems. The HI-LO 200 is ideally suited for the Robertshaw "Classic" zone control system. The control can be mounted in any location and comes with a discharge air duct sensor that can be mounted up to 1000 feet away using only standard #18-2 gauge thermostat wire. The HI-LO 200 offers a wide range of adjustment for both low limit and high limit control in zone applications.

Features

- Solid-state analog control
- Adjustable High/Low Set Points
- Adjustable High/Low Differentials
- Discharge air probe included
- Extremely accurate
- Easy to install and easy to wire

Specifications

Size

5-1/2"H x 4-3/4"W x 2-3/8"D

Power Requirements

24VAC (±10%) at 20 VA

Output Rating

SPDT - 2 relays - isolated contacts

Operating Temperature Range

-30 to 130°F

Operating Humidity

Ambient at 5 to 95% RH - non condensing

Temperature Accuracy

± 1°F

Low Limit Range

35 to 65°F

High Limit Range

100 to 230°F

Robertshaw

ECL-35 SERIES LIMIT CONTROL SUBMITTAL SHEET

The Robertshaw ECL-35 is designed as an evaporator coil low temperature limit and is ideally suited for the Robertshaw "Classic" zone control system. When the ECL-35 is installed to the suction line of the evaporator coil and wired in series with the Y connection to the compressor, its normally closed contact will open when the temperature reaches 35°F and will not close until the temperature reaches 58°F. The ECL-35 has a pre-formed clip attached to secure it to the evaporator suction line. The slow delay between Open and Closed eliminates the need for additional delay-on-break relays.

Features

Easy to install

Protects against coil freeze up

No additional time delays required

Specifications

Voltage

18 to 30 VAC

Current

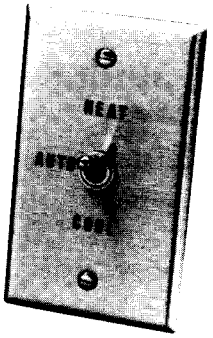
5.0 Amps

Contacts

Open at 35°F/ Close at 58°F

Robertshaw

SW-10 HEAT/AUTO/COOL SELECTOR SWITCH SUBMITTAL SHEET



The Robertshaw SW-10 is a heat/auto/cool selector switch for use with the Robertshaw "Classic" zone control logic panel. When wired to the "Classic" panel the switch can provide external Heat/Auto/Cool mode selection. The SW-10 features a brushed stainless steel mounting plate which fits a standard 2" x 4" electrical 'J' box. The switch is a heavy duty SPDT output with brass screw terminals and is rated at 6 amps at 125 VAC.

Features

Provides remote Heat/Auto/Cool selection

Wires directly to dedicated terminals on Classic Panel

Mounts to any standard 2" x 4" 'J' box

Specifications

Size

2" x 4"

Construction

Brushed stainless steel

Output

Heavy duty SPDT
6 amps at 125 VAC

TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	SOLUTION
Zone thermostat(s) won't work	Improper mode selection or wiring	Check zone thermostat(s) mode of operation and wiring from stat(s) to proper terminals on logic panel.
	Broken wire or terminal insulation	Check wire continuity from zone thermostat to logic panel. Check for wire-to-terminal contact.
	Faulty thermostat(s)	Troubleshoot according to manufacturers instructions. Replace if necessary.
No conditioned air to Zone(s)	Improper zone damper wiring	Check zone damper wiring to proper terminals on logic panel.
	Improper Remote Selector Switch Setting	Ensure that logic panel and zone thermostat are set to proper mode.
	Balancing damper or register closed	Check balancing damper and register position.
	Faulty zone control logic panel	Follow instructions outlined in the Test, Check and Start-up. Replace if necessary.
Equipment will not energize	Improper wiring to logic panel	Check all wiring from equipment to logic panel.
	Improper logic panel setup	Check logic panel slide switch setting.
	Faulty equipment	Troubleshoot according to manufacturers instructions.
	Faulty logic panel	Follow instruction outlined in the Test, Check and Start-up. Check for Fault (Red Light) Replace panel if necessary.

ADDITIONAL TROUBLESHOOTING NOTES

Sometimes the most obvious problems are overlooked. If the logic panel or equipment won't energize, check all primary and secondary circuits with a multimeter. Check fuses and circuit breakers. Check all wiring-to-terminal landings. Look for cracked, broken or loose wire connections. Don't over tighten terminal block screws and make sure that all wires are not insulated at terminal connections.

HELPFUL HINTS FOR END USERS

THE FOLLOWING INFORMATION CAN BE BENEFICIAL WHEN EXPLAINING ZONE CONTROL TO INDIVIDUAL USERS:

HELPFUL HINTS ON INDIVIDUAL ZONED COMFORT USING ROBERTSHAW ZONE CONTROL SYSTEMS

The zone thermostats installed in each zoned area are part of a computerized zone control system that provides individual temperature control best suited to your individual comfort requirements.

It is important that you understand just how a thermostat works to ensure you derive the maximum benefit from this system. Unlike the volume control on your TV or radio, a thermostat cannot provide rapid changes in temperature when you change the temperature setting (set point). Therefore, it should never be necessary to set the temperature above or below a normal comfort range between 68°F and 74°F unless the zoned area will be unoccupied for extended periods of time.

During the Air Conditioning (cooling) season we recommend that you start by adjusting the temperature setting on the zone thermostat to 73°F. If after a few hours you feel too cold or too warm, readjust the temperature setting by no more than 2 degrees. This will allow a gradual temperature change to take place and will help prevent constant re-adjustment of the thermostat set point. Since Air Conditioning also dehumidifies the air, you will tend to be more comfortable at a warmer setting (usually in the range of 72 to 74°F).

During the heating season we suggest that you start with a temperature setting of 70°F and if necessary apply the same amount of 2 degree adjustment until personal comfort is achieved.

Remember, only a few degrees change within the comfort range is all it takes to provide satisfactory results with a Robertshaw zoned comfort system.

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